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Fulfilling Children's Interests in Modern Medical Progress

MURIEL BEUSCHLEIN, Parker Elementary School
and
JAMES M. SANDERS, Chicago Teachers College

The most effective community education is done through the public elementary schools. Here the subject of medical research in its relation to personal and public health problems has not been adequately presented, when it is taught at all. It is the purpose of this discussion to show how children may become interested in advances in medicine made possible by animal experimentation, and how they may become more familiar with ideals of medical research through classroom study and experience.

To young children as in grades one and two, animals are a source of great interest. This is reflected in the texts, storybooks, and pictures for these grades. Much of the teaching of science at this level is based on the study of animals as friends and helpers of man. This is a basic area in the lower grades.

The study of animals, as pets and helpers of man, also extends through the middle grades, where environment of living things is emphasized. The use of animals for food, clothing and transportation is only part of their contribution to mankind. Animals used for experimental purposes in the advancement of medicine completes the list. Thus the concept may be simply developed. Immunization shots and protective vaccinations are experiences in the lives of every school child. The story of this research and the role of animals in making the research possible brings the concept within the scope of their understanding. Their interest in this field can be observed at an early age. Many young children want to be doctors. They play "doctor" and "nurse" as a regular part of their social pattern. Those who do not think of medicine as a career still project themselves into medical situations where they need help as a result of imaginary injuries or real injuries acquired in play.

With children of the middle grades, introduction of progress in medicine may include discussion of such diseases as measles, rabies and polio. Pupils at this level can participate actively in such discussions as many have experienced sickness themselves or have seen it in their

homes.

It was a surprise to one sixth grade teacher to discover that at least ten of her pupils were familiar with diabetes mellitus and the accompanying insulin injections. These were explained in detail by two members of the class. They also described the symptoms of diabetic coma and the need for diabetics to carry an explanatory identification card in the event of collapse away from familiar circumstances.

This was an ideal situation in which to introduce the research of Banting and Best and their use of dogs in the discovery of insulin for the tens of thousands of diabetic victims. The children were shown the film *They Live Again* [1] and an available research scientist briefly reviewed for them the hostile and anti-social activities of the anti-vivisectionists. The class was vitally interested and eager to continue the investigation of other research.

There are innumerable occasions during the semester when incidental informal teaching of this type of material fits naturally into a situation. It not only broadens the child's knowledge of the world about him and leads him to a greater appreciation of the family doctor but also socializes him as a part of the community. Children at this age more consciously think of themselves as a part of a social group than do younger children. In addition to learning about medical progress as such, they may be led to see community problems of public health. The subject of voluntary health plans could also be mentioned here, not overemphasized though, to obscure the essential point, namely that of medical experimentation.

Special occasions, such as the March of Dimes Campaign and the Easter Seal Collection for crippled children bring health problems to the attention of the children. These are opportune times for the teacher to stress the importance and continued need for research in relation to these and other diseases. Within the family or in the classroom an illness focuses attention on health as do special stories of new advances in preventive medicine or treatment, in the daily papers and current publication.

Advance in medicine may be introduced in the study of conservation for upper grade pupils. What could be closer to the lives of the children than their own well-being? It is far easier for them to appreciate the efforts of scientific groups to preserve human lives and prevent sickness than to visualize millions of acres of forests lost by fire or the results of soil erosion and floods, neither of which is within their experience. Therefore human beings may logically be added to the list of natural resources. By the same reasoning the progress of canine euthanasia, which results in the destruction of hundreds of thousands of dogs annually is a great waste. This is more obvious to the pupils when they become aware of the need for new operations and the testing of new drugs, medical equipment and devices.

Children are matter of fact and sensible in their attitudes. They want to be protected against disease. They readily accept the idea that animal experimentation does just that. "I would give up my dog if it would help save a member of my family," is a direct quotation which indicates their viewpoint. Shall we encourage them in it?

Many units for the upper grade science lend themselves readily to the introduction of material on medical progress. For example, in the Chicago Science Course of Study the following units provide this opportunity:

For seventh grade:

Chicago as a center of scientific in-

terest

A study of the effects of stimulants and narcotics

For eighth grade:

Science as a career

A study of natural resources and their conservation

New discoveries for better living

In the social science classes, animal experimentation for medical progress can be developed in connection with health and population problems.

From the foregoing it is obvious that we can include the subject of advance in medicine in the elementary curriculum in either the science or social science units at all grade levels provided the teacher avails herself of current available material. She needs concise information to answer the many questions which will follow the introduction of this subject. No matter how staunch an advocate she may be for science and health instruction, the project loses value if she cannot or does not satisfy the natural curiosity which is stimulated by that subject-matter area.

A vital problem is that of information at the teacher's level but even more important is the need of resources for the children themselves. The teacher's file may supply the sources which provide much of the research material.[2, 3, 4] Her problem is to obtain sufficient and suitable material. Many societies and organizations [5] have available material that is especially designed for presenting this topic. The National Foundation for Infantile Paralysis, American Heart Association, National Society for Medical Research, American Cancer Society, and many life insurance companies are among these. Often the reprints and pamphlets are available in quantities for classroom use. Single copies may be preserved in manila folders and filed. News items from current magazines such as *Coronet*, *Life*, *Science News-letter*, *Reader's Digest* and many others add valuable information and may be preserved for the permanent file. With these resources on hand for pupil use there is an opportunity to encourage independent reading and investigation along the lines of the individual's particular interest.[6]

Elementary teaching is concerned with helping the child understand and interpret his environment. Certainly, advances in medicine are part of this environment and as such should be included with other scientific discoveries. Health is a community problem. Overall community education is a significant part of the basic philosophy guiding educational practices in the Chicago public schools. The advancement of medical research is a community task since no individual, pharmaceutical company, nor medical group can bear the financial and educational burdens alone. Education of parents, through their children, making them aware of the need for experimental medicine is an obligation of the school.

FOOTNOTES

1. *They Live Again*, a 16mm sound film which may be obtained from National Society for Medical Research, 25 E. Washington St., Chicago 2, Illinois. Pay return postage.
2. BEUSCHLEIN, MURIEL, and JAMES M. SANDERS, 1949. "Free and Inexpensive Materials for Science Teachers," *Chicago Schools Journal*, v. 31, Supplement.
3. SANDERS, JAMES M., and MURIEL BEUSCHLEIN, 1948. "The Use of Index Cards in Organizing Course Materials," *School Science and Mathematics*, v. 48.
4. BEUSCHLEIN, MURIEL, and JAMES M. SANDERS, 1950. "Storage of Classroom Visual Materials," *School Science and Mathematics*, v. 50.
5. American Cancer Society, Inc., Illinois Division, 139 N. Clark St., Chicago 2, Ill.
   American Heart Association, 1775 Broadway, New York 19, N. Y.
   Better Vision Institute, Inc., Suite 3157, 630 Fifth Ave., New York 20, N. Y. *Men of Science Classics*.

Metropolitan Life Insurance Co., 1 Madison Ave., New York 10, N. Y.

National Foundation for Infantile Paralysis, 120 Broadway, New York 5, N. Y.

National Society for Medical Research, 25 E. Washington St., Chicago 2, Ill.

6. Suggested Reading for Pupils:

610 E EBERLE, IRMENGARDE, *Modern Medical Discoveries*. N. Y.: Crowell, 1948.

610 K KELIHER, ALICE V., ed., *Doctors at Work*, N. Y.: Harper, 1941.

610.9 F FOX, RUTH, *Milestones of Medicine*, N. Y.: Random, 1950.

920 C MONTGOMERY, ELIZABETH R., *Story Behind Great Medical Discoveries*, N. Y.: McBride, 1945.

CHANDLER, CAROLINE A., *Famous Men of Medicine*. N. Y.: Dodd, 1950.

921 M MAKER, RACHEL, *Dr. Morton, Pioneer in the Use of Ether*, Messner, 1946.

Biographies of L. Pasteur, Walter Reed, William Gorgas.

Fiction:

FELSEN, HENRY GREGOR, *Davy Logan, Interne*. Dutton, 1950.

RIFKIN, LILLIAN, *When I Grow up, I'll Be a Doctor*. N. Y.: Lathrop, 1943.

WORTH, K., *Middle Button*.

STERN, *Amarantha Gay, M.D.*

See also:

RUE, ELOISE, 1950, *Subject Index to Books for Intermediate Grades*, A.L.A., Chicago.

Gold Mine for Biology Teachers

LOUIS C. FINK

194 Springfield Avenue, Rutherford, New Jersey

I am not a biology teacher. Therefore I may be presumptuous to tell biology teachers of their gold mine.

That is, I am not a biology teacher in any accredited school. But any man who takes his son for a long walk on a clear Spring day has to teach a little biology. Why does the bird sing? Why is water sometimes blue and sometimes green? Where have the earthworms been all winter? How does a bug fly? Any father has to be able to answer questions like that, in an unending stream.

I have a son who asks questions, and I have a family of fifty boys which we call a Boy Scout troop. The questions about living things which can be asked by fifty boys are not fifty times the number asked by one boy: rather, the progression is some complex mathematical one, so that fifty boys ask several thousand questions.

I used to be stumped. But ever since I found the gold mine, I have known most of the answers. Not all the answers (nobody knows them all), but a reasonable proportion. And at the gold mine, I met a great many biology teachers, that is, men and women who devote their lives to teaching biology. They were not amateurs like me; they were professionals, but we mined the same vein of pure gold.

To put an end to all this metaphor, let me explain that the gold mine I am talking about is a nature camp—a camp where the emphasis is on nature and how to teach it. Where—for two weeks this summer—a biology teacher can visit an area rich in all forms of growing things, asosciate with other adults interested in the same things, and study under competent instructors who have a genuine enthusiasm for nature study.

Days are spent on field trips to every sort of habitat: dry fields, swampland, meadows, second-growth woods, climax forests, river bank and ocean shore—and even on occasion out on the ocean itself to visit pelagic islands. The emphasis is on learning by seeing and doing; by an observation of birds, mammals, insects, fish and plants, there is gained an insight into the interdependence of all forms of life. The instruction involves a demonstration of teaching techniques, which is

important to the biology teacher.

Perhaps the most pleasant aspect of these camps is their attraction for men and women with mutual interests. Visit a camp for two weeks and you'll meet biology teachers like yourselves. You'll meet conservationists, youth leaders and persons professionally interested in schools, museums, camps and libraries. In the evening, there will be picnics, songfests and a pleasant opportunity to sit around a fire and compare notes.

There are four of the camps, all operated by the National Audubon Society. One is in Maine, sixty miles northeast of Portland at the Todd Wildlife Sanctuary in Muscongus Bay. Campers sleep in comfortable frame buildings, and have an ideal opportunity to study birds, marine life, oceanic islands and the forests of the Maine coast.

A second camp is in Connecticut, at the Audubon Nature Center. This is a 408-acre sanctuary near Greenwich, and not far from New York City. Here the campers live in an Early American home, and make field trips to a farm, to Kensico Reservoir, and to Long Island Sound. The Fairchild Wildflower Garden has 600 species of native trees, shrubs, ferns and wildflowers for your study, and 85 species of nesting birds have been identified.

The third camp is at Kerrville, Texas, where the campus of a junior college, Schreiner Institute, is used. High on the banks of the Guadalupe River, 65 miles northwest of San Antonio, is the Audubon Camp of Texas. Its location is on the Edwards Plateau, where eastern and western forms of life meet. There are dinosaur tracks to investigate, the caves with their millions of bats (and hawk predators waiting outside at dusk!), ranch lands where the student will see the results of good practices and bad in grass conservation, and a truly remarkable blending of animal and plant life from the eastern and western parts of our country.

For their fourth camp, the Audubon Society went high into the Sierras of California. At Sugar Bowl Lodge, in Norden, the camp stands at an altitude of 7,000 feet. You can climb quickly to higher peaks; you can drop down to the grassland foothills. You can study alpine forests and flowering meadows, and you study all the living things in the Sierras and the desert below them in Nevada.

At each of the camps, the leadership is in competent hands. Carl Buchheister, Vice President of the National Audubon Society and a noted speaker on conservation and nature, directs the Maine camp. Charles E. Mohr, who directs the year-round Nature Center in Connecticut, leads this camp—and makes special provision for primary teachers in a six-day course. (Most of the camp sessions are for two weeks.) Dr. Charles LaMotte, Professor of Botany, Department of Biology, Texas A. & M. College, directs the Texas Camp. In California, the director is Dr. Lloyd G. Ingles, Professor of Zoology at Fresno State College.

These men are all skilled at teaching biology and natural science, and more than that, they teach *methods* of teaching. As I said before, I'm not a teacher, but the Audubon camps have taught me plenty about the gentle art of teaching. Projects, methods, discussions, all these are part of an exciting two weeks at an Audubon Camp, where you will meet other people interested in the same lifework as your own, and following it with enthusiasm and intensity.

Full details are obtainable from the National Audubon Society, 1000 Fifth Avenue, New York 28, N. Y. If you are getting a little stale on the job; if you'd like to meet some other biology teachers and talk over mutual problems; if you'd like an unexcelled chance to get out in the open and study all living things; if you want a grand vacation while you get

ready for a better semester of teaching; if you want all these things and more; take a look at the gold mine I was talking about. There are really four mines, and you'll have excitement at each one.

Conservation and Natural Science Education in American Secondary Schools[1, 2]

EMERY L. WILL
Iowa State Teachers College, Cedar Falls, Iowa

It doesn't require much research today to observe the public's awakening interest in the conservation of natural resources, nor to point out that our secondary schools are asking for more and more help in setting up conservation education programs. The realization that conservation should form an integral part of secondary education has helped to focus attention on the most effective ways of presenting it.

Looking at the national picture first, we can observe a decided trend toward regional approaches to the problems of conservation education. While this is particularly prominent in the Southern States' Resource-Use Education Program, it is evident also in the regional organization of certain federal agencies, such as the Soil Conservation Service and the Forest Service, which are especially active in assisting secondary schools.

Although we find legislation requiring the teaching of conservation in at least eight states, there is a growing realization that this method is not necessarily conducive to the best conservation teaching, except perhaps in areas where there has been effective training of teachers. Some states, such as Florida, Maine, and Wisconsin, require that secondary school students receive instruction in the natural resources of their own states.

In Maryland, Michigan, and other states where secondary schools have shown considerable activity in this field, there is evidence of close cooperation among the schools, the state education department, private organizations, and governmental agencies. This cooperation has resulted in the development of pilot school programs, outdoor demonstration areas, bibliographies and informational booklets, teachers' workshops, and conservation weeks.

Turning now to the individual school programs, let us look at a few methods and ideas which are being tried in natural science courses and in separate conservation courses.

Most secondary schools employ the unit and incidental methods of teaching conservation, particularly in biology, general science, agriculture, and social studies. In natural science courses, conservation provides meaning and integration for many otherwise unrelated topics. It is an *intellectual* achievement for our natural science pupils to learn the names of fifty trees, but it would be an *educational* accomplishment for them to become well acquainted with a fewer num-

[1] Excerpts from paper presented at American Nature Study Society meeting held in conjunction with annual meeting of American Association for Advancement of Science (Pacific Division) at Salt Lake City, Utah, June 22, 1950.

[2] About three years ago, the American Nature Association and the Graduate School of Cornell University made possible a series of studies in conservation education. These were directed by Dr. E. Laurence Palmer, Professor of Nature and Science Education at Cornell. For the most part, the information presented in this paper was obtained during the course of these studies.

ber of trees which are important to their community and country. Do they know why black locust and certain willows are used for controlling gully and stream-bank erosion? Can they recognize a "den" tree, a "weed" tree, or a "seed" tree? Can they associate these trees with their native habitats and with their role in the conservation of soil, water, and wildlife?

I think it goes without saying that the most productive conservation education should provide for first-hand experiences and observations for the students. This goal is being reached at many schools through field trips and the development of meaningful projects, including erosion control, school forests which are used for *many* purposes (not just for tree planting), and wildlife feeding areas on school grounds. Biology students at Silver Spring, Maryland, have had an outdoor biology laboratory and wildlife refuge at their disposal. For six weeks every fall and spring, each student could spend a half-day per week at the area. Projects have included the construction of trails, an artificial lake and dam, a tree seedling nursery, a classroom arena, and wildlife feeding stations. In addition, students have undertaken several plant and animal surveys, and have made studies of erosion and pollution.

Turning from this suburb of Washington, D. C., to the State of Washington, we can observe many good examples of conservation emphasis in biology classes. At Elma, the biology and forestry students have teamed together to develop and manage two wooded tracts in this forestry-conscious state. One tract contains the town reservoir, and the pupils have been preparing a nature trail and public recreational facilities there. Nearby, at Montesano, the biology classes have helped to landscape the school grounds, and they manage a small orchard which supplies fruit for the school lunchroom. A stream improvement project was carried out in a small creek behind the school, and part of its logged and burned-over watershed is slated for reforestation as a school tree farm. One further project undertaken here has been the development of a 150-acre school game preserve, complete with observation blinds.

Not all biology projects need to be on such a large scale as those just mentioned. Bird feeding stations, a birds' Christmas tree with all the trimmings, models of farm lands for demonstration of erosion and conservation practices, oral reports of local conservation problems, a small corner of the school grounds set aside for wildlife cover and feeding, and a display of posters and other visual aids at the end of a conservation unit for the benefit of the rest of the school would be useful activities. At Keene, New Hampshire, the biology classes recently highlighted a study of economic values of insects by holding a mock jury trial at which both adult and larval insects were judged for their reputedly bad actions. Although most defendants, such as "Tessie Termite," were convicted, a few were acquitted and praised for their beneficial habits.

With all the fine opportunities for presenting concepts of wise use in our biology classes, it is really too bad that such a relatively small number of secondary school students are exposed to this training. This points up the need for a many-sided approach to conservation throughout the curriculum. In general science, a conservation unit can be organized on the basis of local problems and resources. At Phoenix, Arizona, the 20 seventh grades have a 12-week unit on soil and water conservation, accompanied by units of the same length in "Balance of Nature" and "Earth's Changing Surface." These city pupils are taken to see irrigation dams, examples of erosion, and conservation projects, and they are led to realize the im-

portance of conservation to city dwellers as well as to rural people.

We expect to find some basic information about conservation in agriculture courses, and some social implications in social studies classes. Other phases should be introduced in mathematics, art, music, and other subjects. It is beyond the scope of this report to describe several examples of schools wherein conservation is woven throughout the curriculum. In Merrill, Wisconsin, for instance, a 700-acre school forest provides the background for a first-hand study of conservation through all the school subjects. In several Maryland schools, conservation units have been prepared for an integrated core curriculum in junior and senior high schools.

Separate courses in conservation have been tried in some secondary schools, and their effectiveness has varied from negligible to excellent. Such a course may serve as a focus for all the conservation activities in a school, and thus serve to interest students, teachers, and others in conservation, or it may be only an excuse for other teachers to leave conservation out of their courses because "it is already taught in the conservation course." In the rural community of Steelville, Missouri, the conservation and biology classes have been the principal means of teaching wise use of resources to all students and townspeople. Members of the conservation class sponsor an annual public conference dealing with current problems; they write articles for publication in local newspapers; they conduct tree planting demonstrations; they are developing a tract of unimproved land to demonstrate good land-use practices in the management of soil, water, timber, and wildlife. Many smaller projects help to acquaint everyone with their local natural resources and with the need for their conservation.

In metropolitan Cleveland, Ohio, one high school has experimented with a conservation course with considerable success. Students in the two-semester course undertake several carefully worked out projects, half-day field trips, textbook and supplementary reading, oral and written reports, and individual studies. A feature of this school's program has been the development of two small areas enclosed by the rear wings of the building. One plot is used as a landscaping project and arboretum, while the second one, about 12,000 square feet in area, has been designated a wildlife safety zone. This second area has been left pretty much to nature. Oaks, maples, wild cherry, sassafras, sumac, and mulberry are among the woody species growing there. Except for necessary control of poison ivy, which provides a yearly experience for the classes, no pruning, trimming, or eradicating has been done. Conservation students have used the area for the study of many forms of plant and animal life; and for the study of ground cover, water retention, and plant progression, among other subjects. To make the rest of the student body aware of the program, the conservation class keeps the science display case filled at all times with student-prepared exhibits. It has participated in tree planting demonstrations and special assemblies during conservation week. In other courses, the conservation instructor has helped teachers to introduce appropriate material; references are furnished for reports in social studies classes; conservation posters are approved in the art class schedule; industrial arts teachers offer the use of their facilities for the construction of exhibits; in the school library, a special shelf has been reserved for conservation publications; and most issues of the school paper have carried news items of the activities of the conservation class. Through a soil testing service organized by pupils, and through store window displays, bird houses and feeding stations, many adults in the

community have been made aware of this program.

However, in too many schools where a lively conservation program has been developed, there is just one teacher who is the sparkplug. When that teacher leaves the community, the program usually leaves with her. The new teacher is reluctant to continue the program because of a lack of interest or training. This is not a new problem, but few solutions have been tried out. Here is one idea which has proven to be a help. At New Castle, Indiana, a field trip manual has been prepared, which shows about 18 numbered stations on an enclosed map of the county. These places were selected for their values in teaching conservation. For example, a public park was described as having native hardwoods, an unprotected marsh area, typical birds of open and dense woodlands, and sources of much aquarium material. Another station was a section of rolling farmland, some of which was wooded, some in permanent pasture, and on which classes could observe dams for water control, diversion ditches, and sodded waterways. Just think how valuable such a guide would have been for you at your first teaching position!

Santa Barbara, California, has used another plan, the formation of a city-wide teachers' conservation council, with a sub-council for each school. This organization serves as a clearing house for information and activities, as a sparkplug and coordinator for conservation week programs, and as a means for emphasizing conservation throughout the year.

At Steelville, Missouri, where for generations the people have earned their living from their forest and iron resources, considerable thought was given to the problem. It resulted in the formation of a county conservation council composed of the superintendent of schools, a member of the board of education, the county extension agent, and the area supervisor of the State Conservation Commission. In this way, the original long-range plans for developing the school conservation program should not be forgotten nor neglected, even if one or more members of the council should leave the community.

These examples of methods and means of presenting conservation in secondary schools were drawn from widely scattered sections of the country. Despite these and other notable instances, the amount and quality of conservation education in our secondary schools is far from being adequate or satisfactory. In this writer's judgment, the major problems could be summarized as the following set of recommendations:

1. A great need still exists for literature dealing with local and regional resources, particularly teachers' guides and informational booklets.
2. More extensive research is needed in the field of conservation education within each state or region, including studies of teacher-training.
3. In order that they may understand better what, how, and where conservation may be brought into the curriculum, teachers should take a background course in the natural resources and their conservation.
4. Within a school unit, there is a need for a many-sided approach to conservation education.
5. The study of conservation should be presented realistically, based upon local resources and problems.
6. Accompanying the development of a school conservation program, provisions should be made for the continuance of the basic purposes and long-range plans which were established on the basis of community needs and resources.

SCIENCE FAIR

The Brookline High School Science Clubs, Brookline, Massachusetts, held their Sixth Annual Science Fair April 30 and May 1, 1951.

Aids for Teaching Health at the Senior High School Level

BEA BUZZETTI
Bremerton High School, Bremerton, Washington

Eyes

Students enjoy testing their sight with a standard chart. Another thing to do is to get a pair of glasses used in the driver's test. They have a prism or wedge on one glass which makes one object, such as a light, look like two since the image appears to be coming from a different location through this wedge. Most of us have a "Master eye"; when the prism glass is over the other eye it simply ignores it and, the "Master eye" working alone, you still see but one light. Momentarily closing the "Master eye" will force the other into activity and then when the "Master" is opened you will see two lights. If the prism is placed over the "Master eye" you will see the two lights at once as it never fails to register.

Also pupils are interested to know that in looking in a microscope we can keep both eyes open because we mentally block out the one not over the scope.

A simple method of determining your "Master eye" is to sight an object at 15 or 20 feet using your finger tip extended at arm's length as a sight. Now close your right eye, being careful not to move your head or your finger. If the object remains in line with your finger tip you are "left-sighted," if it appears to move you are either "right-eyed" or your eyes focus alike or nearly so. Next close your left eye. If the object remains in line with your finger tip you are right-eyed, if it appears to move you are either left-eyed or your eyes focus equally or nearly so. If it appears to move about the same amount but in opposite directions as you close your eyes alternately, they focus alike.

Color Blindness

Central Scientific Co., Chicago, Illinois, has for sale a set of slides for the Balopticon which are most interesting. By using the slides one tests for color blindness. Then, for the normal people, there is a slide of many colors to project. Next place various slides in front of it and the image on the screen shows us in what type of world the various types of color-blind people live.

Feeling or "Limen Distance" for Pain

Blindfold the student. Take 2 pins and place them on the skin close together simultaneously. The patient will feel the prick of only one pin, i.e., he cannot differentiate. Now continue the experiment moving the pins farther apart each time until the student recognizes the pricks of both pins. This distance is termed the limen distance for feeling and it is greatest on the back of the hand and shortest on the tongue. This is the reason that a small cavity in a tooth feels to the tongue like a huge cave. Psychologically we recognize every small sensation given to the tongue by touching the inside of the cavity and since in general we touch things with other parts of the body we interpret the distance of these sensations in terms of other parts of the body.

Habit

Discuss the four laws of habit formation.

Prepare for the habit you wish to form by listing all reasons for and against, thus thoroughly convincing yourself that you really want to form it, then—

1. Make a strong start.
2. Act on every opportunity.
3. Allow no exceptions.
4. Be open to suggestions for doing it in a better way.

Ask each student to list a habit they will form or break by substitution or other method and check later.

Taste

An interesting experiment to prove that we have but four tastes, sweet, sour, bitter, salt.

Materials

A towel or cloth to blindfold the student
Cut in small cubes:
- Apple
- Potato
- Carrot
- Turnip
- Onion

In solution:
- Sugar
- Salt
- Vinegar
- Any weak alkaline substance

Forceps
Medicine dropper

Blindfold the student; have him hold his nose and open his mouth. Now with the forceps place the cubes, one at a time on the tongue—only for an instant. The student is asked to respond quickly in naming the food. Results will vary but will usually follow the law of chance; i.e., with five chances about one in five will be right. Apples are often detected because of their sweetness.

Now try the liquids with the medicine dropper again asking the students to respond quickly. Most of the answers will be correct.

Boiling at High Altitudes

Since foods are important for health, students are always interested to know why beans cannot be cooked on a mountain without a pressure cooker.

The only materials necessary for this demonstration are a flask and a 1-hole rubber stopper stopped with a piece of solid glass rod. This makes it possible to retrieve the stopper should it be forced too far into the flask.

Fill the flask half full of water. Heat to boiling so that the air will be driven out and the space filled with steam. Remove from the flame and insert the stopper.

When it has stopped bubbling, place it momentarily under the cold water faucet. It will boil vigorously because the cold water condenses the steam thus leaving a partial vacuum or lessened air pressure over this water. Now state the definition of the boiling point:

> that temperature at which the vapor pressure inside the liquid equals the atmospheric pressure outside.

Heat increases the vapor pressure. The water will boil until the space above the water is again filled with vapor at a pressure equal to the vapor pressure inside the liquid. This can be repeated until the water is only lukewarm provided that air does not leak in around the stopper or the glass rod. Since nothing in the water can get hotter than the boiling temperature it is clear that many vegetables would never cook at high altitudes unless pressure cookers were available.

You may now explain that it is not the pressure which causes a pressure cooker to cook food so rapidly but the fact that increased pressure raises the boiling point and the food is cooked at a much higher temperature.

Bacteria

Prepare agar-agar in sterile Petri dishes. Ask students to do the following:

1. Touch the tips of the fingers to the culture medium. (Select someone with a moist hand—it works better.)

2. Open one dish to the air for the duration of the class.
3. Have a student moisten the lips and then touch the agar-agar as if kissing it.
4. Take a hair from an oily head and place in one dish.
5. Pull the wings off a fly and let it walk over the medium.
6. Sneeze on one.
7. Dig some dirt from beneath the nails and place this on the medium.

Ask the students for other suggestions. Incubate these for 24 or 48 hours and note results.

Under favorable conditions bacteria multiply about every 20 minutes or 72 times per 24 hours. Each germ which was invisible to us when "planted" now appears as a colony. If the work is carefully done the exact imprint of the fingers, lips, etc., will be "engraved" in beautiful shining colonies of bacteria. Keep the cultures for a few days and pigment will develop in some of them:—*Sarcinia lutea*, lemon yellow; *B. prodigiosus*, red, and so on.

Now you may be interested in testing some antiseptics. Make agar-agar "slants" by pouring the melted medium into sterile test tubes and allowing them to cool resting with rim raised on a ruler or edge of book. Plant some bacteria from the cultures to the slants with a platinum or iron needle with glass handle. Then pour the antiseptic in question over the surface and incubate. If germs develop into colonies the antiseptic was no good. Most mouth washes prove to be useless.

Caution must be stressed in this experiment as some of the germs might, by chance, be pathogenic. Sterilize the contaminated agar before discarding.

Cave Exploring on Field Trips

BROTHER G. NICHOLAS, F.S.C.
La Salle High School, Cumberland, Maryland

It is generally realized that an important phase in the proper teaching of biology is the field trip. However, in many schools it is difficult or even impossible to hold field trips due either to the locale of the school or to the curriculum. In order to stimulate interest in field trips on Saturdays and other holidays, the technique of cave-exploring has been used quite successfully as a means of having the students spend a whole day studying the ecology of the region. Obviously, this method cannot be adopted by all schools, nor can it be attempted without much planning and careful supervision, but the results have been extremely encouraging and made worthwhile the time and energy spent in preparation for the trip.

To begin with, for safety's sake, no more than a dozen at a time are allowed on a single trip. As a result there is great competition to be permitted to go, so that those making the trip appreciate it even more. All members are required to bring equipment which is in conformity with the safety suggestions of the National Speleological Society. Several days before starting the journey, a meeting is called of those selected and the purpose, regulations and general plan of the trip explained. Cumberland and the surrounding territory abound in limestone deposits, especially the Keyser, Wills Creek and Tonoloway formations. In these deposits are found many caves, a good number of which are not mentioned in the literature dealing with the geology and caves of the region.

Extreme caution is used while actually underground, and a rigid set of rules imposed. As a result, no accidents of any sort have occurred; the only casualties being two cases of ripped pants. No one

should attempt to guide a group on such a trip unless he is an experienced "spelunker" himself. No description will be given here of the means and ways of exploring caves since it would be familiar to those who are regular cave explorers. Those who have never been in a cave should contact someone who can train them in the intricacies of this particular occupation before starting out on their own. The students comprising those on the trip always include at least three or four who are familiar with caves.

The lichens found near the entrance and fungi usually seen farther back present an opportunity for a discussion of symbiotic and saprophytic relationships. Any bones found are intriguing, even if only those of common animals. Later, when the bones are cleaned and on display in the laboratory, keen interest is shown in the identification of the various parts. So far, only one unusual bone has turned up. It is the left ramus of a mandible, tentatively identified as *Martes parapennanti*, a new species of Musteidae originally reported by Gidley and Gazin.* Two species of bats are commonly seen, the Little Brown Bat and the Georgian Bat. These bats are never disturbed, but, if possible, are closely scrutinized for possible banding. Some arthropods are usually seen, although many are not true cave forms, but terrestrial types that have been able to adapt themselves to caves. Students are impressed at seeing any type of insect or spider and ask many questions about them, their food, means of reproduction, and the like. A few mollusks have been found, but it is believed these were washed in from the surface.

Near the entrances, salamanders and a toad have been caught. Once, a blind salamander was encountered, but left in the cave since so many of this type are being taken from caves that their numbers are decreasing. Frequently, dens of skunks, chipmunks and other such forms are seen, but no snakes have as yet been encountered.

Of course, the exploration of caves not only gives an opportunity for biological studies, but geology and related topics can be discussed. Usually, a walk of several miles is necessary, and both going and coming interesting scientific sights can be pointed out.

The only real problem is to abate the enthusiasm of those making the trip. Even though it is an all-day affair, there is always plenty of interest even up to the time of arriving home. Besides the obvious advantages of such a trip, there are several others, such as the fostering of an outdoor hobby and recognition of various types of rock strata. Finally, it gives the teacher a marvelous opportunity to observe his pupils at close range and note their reactions to the many unusual objects and events encountered on such a trip. This is a big help in determining what sort of character a particular individual possesses and thus in guiding him when advice is asked or assistance sought.

* Gidley, J. W., and Gazin, C. L. New Mammalia in the Pleistocene Fauna from Cumberland Cave. *Journal of Mammalogy*, Vol. 14, No. 4, p. 348. Nov., 1933.

INDELIBLE INK

A high grade indelible ink may be extracted from used hektograph or Rexograph Carbon. Place together a dozen sheets of the carbon and cut in four strips lengthwise. Coil loosely in a glass or jar and immerse in about two ounces of warm water for an hour or so. Pour off the fluid, rinse with a smaller amount of water, and add this to the ink you have already saved.

James M. Sanders,
Chicago Teachers College,
Chicago, Illinois

Can We Bridge the Gap?

ARTHUR JOHN BAKER
Crystal Lake Community High School, Crystal Lake, Illinois

Aesop's fable of the miser who buried his gold at the foot of a tree only to discover later that he had been robbed of his treasure is familiar to most of us. Since he had never used his wealth but only looked at it, his neighbors insisted he could get as much pleasure out of looking at the empty hole. The obvious moral, "Wealth unused may as well not exist," correlates with the hidden treasure of human resources untapped by our gross neglect in the area of health instruction.

Dr. George E. Stoddard has well said: "To be backward in educational pursuits or demands is to deny the glory of human growth. Whatever the average is, it can be raised."

With these words as a foundation for action, the Association of Secondary School Principals of Illinois formed a committee to work on curriculum revision. Through the efforts of Vernon L. Nickell, State Superintendent of Public Instruction, the 65th General Assembly appropriated $35,000 to advance this work. As a result of this legislative action, the Illinois Secondary School Curriculum Revision program was organized on a state-wide basis under the leadership of Dr. Charles W. Sanford, Coordinator of Teachers' Education, University of Illinois.

The staff of the Crystal Lake Community High School, District No. 155, accepted their part of this tremendously important program, that of being one of the three schools in the state of Illinois chosen to work in the area of health.

Stimulated by a fine group of technical advisers, the health committee of this high school embarked on a thorough testing program in the areas of health practices, health knowledges, health attitudes, and health interests. 1,085 tests were presented to students in grades 9, 10, and 11.

As the tests results were analyzed, it was startling to discover the gap between health practices and health knowledge of students. This gap presents a strong challenge to all teachers of health instruction.

It would not be amiss to reveal at this point some of the results of this testing program, as they have to deal with the above mentioned gap.

One example is the care of fresh fruits before eating. 36.1% of our students eat apples, plums, and other fruits without washing them, but strikingly enough, 92.3% of them know that there is a danger of disease from unwashed fruits and vegetables.

The following figures are not amazing, for we are all familiar with the impractical eating habits of youth. But it is not through ignorance that so little attention is paid to better eating. While 70% of our students care not one bit about whether their meals are balanced when eating in restaurants or cafeterias, it is a glaring fact that 93.4% of our students know the value of selecting balanced meals.

Another marked differential between knowledge and habits is shown us in the area of disease contagion. 79.2% of our students just don't cover their coughs and sneezes, in spite of the fact that 94.8% of our students know that one should always cover a cough or sneeze. Another example in this area is illustrated by the fact that 38% of our students use individual towels and wash cloths, while 90% see value in such practices.

Again in the area of mental health our

leadership and advice has fallen short of the mark as shown by the fact that 35.6% of our students bite their finger nails, while 91.7% of our students recognize the value of attempting to break nervous habits such as these. Could it be that we have not taught them how?

The educator can conclude from the results of this testing program that truly, as has been written many times before, good health habits are an idea, or state of mind, and not facts learned by the student and parrotted back to teacher in tests and classroom discussion.

No one has the true answer as to how we can bridge this gap between health habits and health knowledge, but tremendous strides can and should be made toward this end. We must make this teaching of health more meaningful. We must build upon the interests and needs of youth. We must find worthwhile criteria by which to judge each point of our instruction; we must break down the walls of our health laboratories and expand them to include the whole community.

Have you a little spark of ambition? We need help in a task that we have started. Join us, will you? We're just building a bonfire of the dead wood that we are clearing out of insignificant health instruction.

Living Animals for Demonstrations to Elementary Students

Pinky and her scarlet toenails have proven attractive to even the most timid children. Pinky is the current one in a series of tame white mice and rats with the latest color in nail polish on her toes.

The excellent job being done by elementary teachers in nature study leads them to ask for something different for demonstrations. Live animals prove more interesting than dead ones. The shyest children forget that Pinky is a mouse or rat while admiring her nails. Combing her hair with a baby's hair brush is the next step and soon everyone is petting Pinky.

While Pinky is being handled, I talk about diet—the details depending upon the age group. If possible, Pinky's gleaming hair, bright eyes and large size are compared with the dull and falling hair, scaly eyes and small size of a rat on a vitamin deficient diet. (I use rats from whatever dietary experiments are being run at the time by my physiology classes. However, commercial deficient diets are very effective in producing rats for demonstration.)

As a common amphibian, the frog is useful. Normal, living frogs are too active—even college students have difficulty handling frogs at first. Dead frogs are not attractive. However, decerebrate frogs are practical; they are alive but passive. A single stimulus produces a single response, so that one hop is as far as a frog gets away from over eager hands. The tongue and eyelids are easy to demonstrate. These frogs are easily prepared by a transverse cut with a scalpel through the skin and roof of the skull at the level of the anterior edge of the tympanic membranes, severing the brain, and then pithing forward. If the cut is crooked the frogs may go in circles, but that makes no difference for demonstration purposes. After a few days the wound scarcely shows. Since the cerebrum and diencephalon are destroyed the frog makes no voluntary movements and feels no pain. Living animals that can be handled easily have proved more effective demonstration materials than photographs.

Editor's Note: The above paper was accompanied by the following letter:

Dear Dr. Breukelman:

Enclosed is an account of some demonstration material that I have developed to sugar-coat physiology lectures that have been presented to elementary students. Similar animals have been used for kindergarten, eighth grade, Scout, and church groups.

Sincerely yours,

ELIZABETH W. SMITH,
Kent State University,
Kent, Ohio

THE AAS COOPERATIVE COMMITTEE

The Cooperative Committee for the Teaching of Science and Mathematics held its first annual joint meeting with the United States Office of Education in Washington, D. C., on November 17–18, 1950. It was decided that a business meeting should be held with the Office of Education each fall, with another in the spring, probably in Chicago.

Dr. Karl Lark-Horovitz, who has been with the Committee since its origin in 1941, and who has served as its chairman during the past six years, resigned that position as of November 1, 1950. Dr. Morris Meister, Principal, High School of Science, New York City, was elected to take his place.

Dr. Meister expressed praise for the dynamic leadership of Dr. Lark-Horovitz and called attention to a summary of the activities of the Cooperative Committee which was published in the February 24, 1950, issue of *Science*. A report on the activities of the Committee during the year 1949–50 was read and it became the basis for discussion at the first session of the meeting.

The work of the Committee since 1941 has been concerned with three major problems. They are:

1. Teachers' certification and training program.
2. Science curriculum in the schools.
   a. College preparatory.
   b. General education.
3. Equipment and laboratory procedure.

A number of recommendations have been proposed by the Committee which pertain to these problems, and as a culmination to his service as chairman, Dr. Lark-Horovitz submitted a program of implementation for these recommendations. A copy of the "Implementation Program" may be obtained by any interested NABT member by writing to P. L. Whitaker, Indiana University, Bloomington, Indiana. Also, copies of reprints of articles published by the Committee may be had as long as the supply lasts.

As a further step in its program, the Cooperative Committee moved to establish lines of communication with such groups as the American Association of School Administrators, the Association of Chief State School Officers, and the American Council on Education in order to strengthen cooperation in working on common problems.

After meeting jointly with two other groups, the National Association for Research in Science Teaching and a representation of classroom teachers and supervisors of science, it was decided that the Cooperative Committee should continue to work along lines of interest embodied in the "Implementation Program." Specifically these items are included:

1. Teacher certification including the fifth year program. Differentiation of the fifth year program from the Master's degree program.
2. Provision of adequate practice teaching experience. Utilization of subject matter specialists in the supervision of practice teachers.
3. The in-service training program. Aiding teachers to keep abreast of advances in subject matter and teaching techniques.
4. Provision of an adequate science offering for all students; general education and college bound. The double track approach.
5. Adult education in science—Scientific literacy.
6. Appropriate laboratory and demonstration equipment.
7. Activities of College Entrance Boards.
8. Impact of Universal Military Training on curriculum and supply of teachers.
9. The place of science in the core curriculum.

10. Evaluation of the effect of understanding science on behavior.
11. Identification and recruitment of the science talented.
12. Improvement of College instruction.
13. Conservation Education.
14. Preparation of guidance material in the sciences.

The service of the Committee may consist of three parts as far as this program is concerned. It can (1) collect and disseminate information for action by other groups; (2) act in an advisory capacity; (3) operate as an action group where it has competence and resources.

National Association of Biology Teachers

COMMITTEE ON OUTDOOR EDUCATION AND CONSERVATION

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Eugene Stern, James Monroe High School, 172d Street and Boynton Avenue, New York 59, N. Y.

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W. A. Williams, Jr., Mohave County Union High School, Box 951, Kingman, Ariz.

Region Eight

Clifford D. Knapp, *Chairman*, Gallatin Count High School, Bozeman, Montana.

Dear Member of N. A. B. T.:

Our Health Committee has grown from 8 members last year to 47 this year; this is a healthy growth in size and very definitely in interest. Congratulations to Betty Lockwood and committee of last year for this excellent achievement.

I would like to suggest that the above Regional Chairmen who do not have very many members on their respective committees, enlist and secure the aid of new members in their regions. If you can get new members in the NABT it will help the cause and if you place them on the committee with you, we have gained doubly. We know that the teaching of biology and health education is gaining each year; let's try to put some of that gain in our organization as new members of NABT as well as for the increasing interest in our Health Committee.

Sincerely,

CLIFFORD D. KNAPP,
Chairman NABT Health Committee,
Gallatin County High School,
Bozeman, Montana. 1/11/51.

BOOK REVIEWS

BERNARD, CLAUDE. *An Introduction to the Study of Experimental Medicine.* Trans. by Henry Copley Greene. Henry Schumann, Inc., New York. v–xix + 226 pp. 1949. $3.00.

This treatise on experimental medicine, first published in 1865, is a classic of the philosophy of science. It describes the development and use of the experimental method in medicine in the artificial production of disease by chemical and physical means.

Known as the founder of experimental medicine, Claude Bernard considered three parts basic to his work: physiology, pathology, and therapeutics. He outlined the successive steps which he followed in his study of the pancreas, liver and vaso-motor system in an effort to define and determine the method by which a scientist approaches a problem and makes his deductions.

The role of Claude Bernard as a scientist and the contributions which he has made to this generation are stated in the introduction by Lawrence Henderson, Professor of Biological Chemistry, Harvard University. A short biography of Bernard is also included.

This work should be of interest to students of medicine, biological and chemical sciences and to philosophers who wish to examine the reasoning process and deductions made in presenting the experimental method in medicine.

RUTH A. DODGE,
24 East Linden St.,
Alexandria, Virginia

GRIBBLE, LLOYD RAYMOND. *Comparative Anatomy Laboratory Manual.* Blakiston Company, Philadelphia. 231 pp. Paper cover. 1950. $3.00.

An instructor of comparative anatomy who has examined this manual regrets that some of the excellent drawings are too small for effective use. However, he praises the content and organization. It is designed as a guide for dissection studies of amphioxus, carp, frog, alligator, pigeon, bat, seal, cat, sheep, dogfish, necturus, turtle, chicken, and woodchuck. (For some of the specimens, only selected systems or organs are included—for example, the skull and teeth of the woodchuck.) A final chapter deals with observations on anomalies and variations in the cat.

RICHARD F. TRUMP,
Senior High School,
Ames, Iowa

CONSERVATION PROJECT

THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS has received from the American Nature Study Association a grant of $10,000 to conduct a project "to make biology a more effective means for the teaching of conservation through the instrumentality of the National Association of Biology Teachers." A Liaison Committee, consisting of E. L. Palmer, Edgar Martin, Richard Westwood, Ruth Dodge, Betty Lockwood and John Harroid, has been appointed and plans to meet in Washington May 28 to discuss the project and make plans for summer activity. The project will probably be limited largely to the Junior and Senior High School Science and Conservation fields.

The October issue of *The American Biology Teacher* will report the Conservation Project Activities to date and present full details of plans for the future.

BRAUN, LUCY E. *Deciduous Forest of Eastern North America*. The Blakiston Company, Philadelphia. xiii + 596 pp. 1950. $10.00.

Deciduous Forest of Eastern North America is a strictly technical book which can be used as a reference book or as a textbook for advanced students in ecology, forestry or other related fields. This book attempts "to present information on the original forests, to analyze and compare climax communities, to trace the expansions and contractions of the Deciduous Forest Formation and its segregation into types and to demonstrate the genetic relations of its several parts."

In the chapter on forest ecology and terminology listed under the heading of Introduction, important words are in bold-faced type and short, clear-cut sentences are used in defining these terms. In Part II, "The Deciduous Forest Formation," the nine main forest regions of eastern North America, their location, the types of trees that are dominant in these regions, and the relative abundance of the dominant trees are described. Part III, "The Evolution of the Present Pattern of Forest Distribution," is divided into six chapters: Problems of Forest Distribution; The Paleobotanic Record; Disjunct Occurrences of Species and Communities and Their Significance in Forest Migration; A Brief Physiographic History of Eastern United States; A Chronologic Account of Forest Development Correlated with Physiographic History and The Relationships of Climaxes and the Climax Elements of the Forest Regions. There are excellent illustrations, several tables and maps, and inside the back cover is a large folding map which shows the location of the forest regions that were described in the text. The book is concluded with a complete bibliography and an index of scientific and common names of the plants mentioned in the text.

The text is not too easy to read, as some knowledge of the names of the trees, especially the scientific names, is required.

LOIS REDMOND,
State Teachers College,
Emporia, Kansas

A LIVING BIOLOGICAL LABORATORY

W. M. Welch Manufacturing Company, one of the long time advertisers in *The American Biology Teacher*, is making available, free of charge to biology instructors, a booklet by the above name. *A Living Biological Laboratory*, by M. E. Smallwood, is an illustrated booklet of twenty 8½ × 11 inch pages, arranged in double column style. After a introductory paragraph, there are descriptions of various common laboratory animals and plants, together with discussions about their use. Some of animals included are ameba, crayfish, clam, snail, butterfly, beetle, sunfish, frog, turtle, alligator, dove, white rat, rabbit. Except for the back cover, there is no advertising matter. Interested teachers should write to W. M. Welch Manufacturing Company, 1515 Sedgwick Street, Chicago 10, Illinois.